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The Fukushima Crisis and the Future of Japan's Power Industry

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Japan's power sector is at a major turning point. The ongoing crisis at the Fukushima nuclear facility highlights to the general public the potential dangers associated with Japan's ambitious nuclear power targets and its preparedness for natural catastrophes. The Japanese government will need to make a comprehensive, urgent reassessment of the power industry and develop a new, integrated energy policy to achieve a greater degree of energy security while meeting climate change goals.

Fereidun Fesharaki, East-West Center Senior Fellow, and **Tomoko Hosoe**, East-West Center Project Specialist, argue that after the Fukushima nuclear crisis, "[t]he Japanese government will need to make a comprehensive, urgent reassessment of the power industry and develop a new, integrated energy policy to achieve a greater degree of energy security while meeting climate change goals."

Currently, Japan has 55 nuclear units that provide 49.6 gigawatts (GW) of capacity, almost 30% of Japan's power needs. Tokyo Electric Power Co. (TEPCO), Japan's largest electric utility that supplies the Kanto region including the Tokyo metropolitan area, owns 35% of the country's total nuclear capacity. It maintains three plants: Fukushima Daiichi (4.7 GW) and Fukushima Daini (4.4 GW) in the Fukushima Prefecture, and Kashiwazaki-Kariwa (8.2 GW) in the Niigata Prefecture.

The Japanese government set ambitious targets to increase the share of nuclear power generation many years ago. This strategy aimed to achieve Kyoto climate change goals and diversify Japan's energy mix away from oil, thereby reducing its energy reliance on the Middle East. (Over 85% of Japan's total crude oil imports come from the Middle East today.) The current target calls for nuclear power to comprise 50% of the country's total power generation by FY2030. To achieve this, Japan would need to build 12-14 additional nuclear units, and boost the utilization ratio of operating units from the pre-disaster level of around 71% to 85-90%.

The severe earthquake—9.0 on the Richter scale—and tsunami that hit northeast Japan on March 11 was an enormous human tragedy and severely damaged the basic infrastructure of power plants and refineries. About 9.7 GW of nuclear power capacity went offline in the region, along with about 9 GW of additional thermal power capacity. The electric utilities affected are TEPCO, Tohoku Electric Power Co., and Japan Atomic Power Co. The natural disaster also took down approximately 14% of Japan's oil refining capacity, which amounts to 620 thousand barrels per day.

The radiation leakage into the atmosphere and sea water is a health hazard, and some of TEPCO's staff at the stricken Fukushima Daiichi plant are suffering from over-exposure. It is reasonable to assume that the disaster has shut down the Fukushima Daiichi plant permanently and that the nearby Fukushima Daini plant will not be operational for the foreseeable future, if ever.

This marks the second nuclear crisis TEPCO has faced in the last four years. In July 2007, an earthquake off Japan's northwestern shores with a magnitude of 6.8 on the



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Richter scale hit TEPCO’s 8.2-GW Kashiwazaki-Kariwa nuclear power plant completely. TEPCO immediately shut down the plant. To date, only four reactors are operational, not because the rest are damaged, but because the local government and community are not convinced that the other three reactors are safe to operate.

Even before the crisis, there was strong public opposition to Japan’s ambitious nuclear policy. This has been the case despite the economic benefits to host communities in the form of employment and government subsidies. Coupled with Japan’s declining energy demand outlook as its population ages and shrinks and as energy-intensive industries have moved offshore, the strong opposition casts a deep shadow over the government’s long-term nuclear power objectives.

Even if public opposition could be overcome, the scale of the Fukushima crisis will undoubtedly bring about stricter safety regulations that will delay the expansion of existing nuclear plant capacities and the construction of new plants. Already utilities are taking precautions: some, including TEPCO, have suspended construction work of a new nuclear units and/or land reclamation work for new nuclear plant construction.

Moreover, the Japanese government will require stricter inspecting regulations of existing nuclear plants. Currently, utilities are obliged to inspect their nuclear reactors every 13 months, but they can petition the Japanese government to extend the maintenance frequency and life span of their nuclear plants. The present regime will develop more rigorously. In addition, the disaster has inspired the Japanese government to demand that all utilities re-inspect their nuclear plants’ survivability against larger-scale earthquakes and tsunamis.

Japan’s fuel cycle program will be reassessed as well. Resource-poor Japan has strived to achieve a nuclear fuel cycle program, emphasizing the important role the nuclear fuel cycle plays in utilizing limited uranium resources effectively and efficiently. After a 1995 accident at Japan’s prototype fast breeder Monju reactor, the construction of fast breeder reactors has been effectively suspended. Instead, the government has pursued an interim “pluthermal” strategy in which a mixed plutonium-uranium oxide fuel, commonly called MOX and using uranium and plutonium extracted from spent nuclear fuel, is used in commercial (thermal) nuclear power plants. Despite opposition and delays, since late 2009, a few Japanese utilities—including TEPCO since 2010—have begun to use MOX.

As the Japanese government and power industry continues to struggle to bring the Fukushima facility under control, they also need to urgently begin to grapple with the longer term policy implications. Several salient aspects will be critical for the Japanese government to review: 1) stricter regulations on protective measures against natural disasters for new construction of power plants; 2) the viability of Japan’s nuclear fuel cycle program; 3) Japan’s 25% greenhouse gas emission (GHG) reduction target by 2020 and more realistic means of achieving this; and 4) the government’s plans to eliminate Japan’s “excess” oil refining capacity, as Japan continues to face unexpected nuclear power shutdowns.

There is a dire need for an integrated energy policy in Japan that is grounded in a new post-Fukushima reality. Such an energy policy will require a reassessment of all kinds of renewable energy, including nuclear power and a review of future energy use in Japan.